

IN THE CLAIMS

Claims 1-24 (cancelled)

Claim 25 (new): A process for the preparation of a polymer composite comprising internally distributed deposition matter wherein the process comprises providing a deposit of deposition matter at the surface of a solid state polymer substrate by fluid phase deposition of discrete particles or dissolved deposition matter by immersion or spraying of solid state polymer substrate with a solution, dispersion or suspension of deposition matter, drying by freezing, evaporation, heating or blotting whereby the deposition matter adsorbs from liquid phase on to the polymer surface and forms an adsorption layer of deposition matter which is intact to solvent and impact effects contacting the surface deposited polymer with a plasticising fluid or a mixture of plasticising fluids under plasticising conditions to plasticise and/or swell the polymer and internally distribute deposition matter, and releasing the plasticising fluid or fluids to obtain polymer composite.

Claim 26 (new): A process as claimed in Claim 25 wherein deposition matter is present, presented as concentration of deposition matter on polymer, in the range 1×10^1 to 1×10^3 ng/mg, or of the order of picograms or nanograms per 5g polymer, or 1×10^{-12} to 1×10^{-9} wt%.

Claim 27 (new): A process as claimed in Claim 25 which comprises providing a deposit at the surface of a high surface area polymer substrate.

Claim 28 (new): Process as claimed in Claim 25 wherein the polymer substrate comprises a powder bed or a high porosity matrix.

Claim 29 (new): A process as claimed in Claim 25 wherein a deposit comprises a deposition layer of deposition matter on any internal and external exposed surfaces of the polymer substrate, including any exposed surface pores; over the entire surface area or only part or parts thereof.

Claim 30 (new): A process as claimed in Claim 25 wherein the solid state polymer substrate is obtained by contacting polymer with plasticising fluid or a mixture of plasticising fluids under plasticising conditions to plasticise the polymer, and releasing the fluid in manner to obtain a solid state substrate polymer.

Claim 31 (new): A process as claimed in Claim 25 carried out in the absence of additional solvent capable of dissolving the deposition matter.

Claim 32 (new): A process as claimed in Claim 25 wherein immersion is for a time of the order 1 second up to 48 hours.

Claim 33 (new): A process as claimed in Claim 25 wherein drying is for a time up to 48 hours.

Claim 34 (new): A process as claimed in Claim 25 wherein plasticising conditions comprise a temperature in the range -200°C to $+500^{\circ}\text{C}$.

Claim 35 (new): A process as claimed in Claim 25 wherein plasticising conditions comprise a pressure from in excess of 1 bar to 10000 bar.

Claim 36 (new): A process as claimed in Claim 25 wherein the process is carried out for a contact time of surface deposited polymer and plasticising fluid of 20 milliseconds up to 5 minutes.

Claim 37 (new): A process as claimed in Claim 25 which is carried out without blending.

Claim 38 (new): A process as claimed in Claim 25 wherein plasticising fluid is selected from carbon dioxide, di-nitrogen oxide, carbon disulphide, aliphatic C₂₋₁₀ hydrocarbons such as ethane, propane, butane, pentane, hexane, ethylene, and halogenated derivatives thereof such as for example carbon tetrafluoride or chloride and carbon monochloride trifluoride, and fluoroform or chloroform, C₆₋₁₀ aromatics such as benzene, toluene and xylene, C₁₋₃ alcohols such as methanol and ethanol, sulphur halides such as sulphur hexafluoride, ammonia, xenon, krypton, and mixtures thereof.

Claim 39 (new): A process as claimed in Claim 25 wherein deposition material is selected from (pharmaceutical) drugs and veterinary products; agrochemicals as pest and plant growth control agents; human and animal health products; human and animal growth promoting, structural, or cosmetic products including products intended for growth or repair or modelling of the skeleton, organs, dental structure; absorbent biodeposition materials for poisons, toxins.

Claim 40 (new): A process as claimed in Claim 25 wherein deposition matter alternatively or additionally comprises function enhancing components, including naturally occurring or synthetic or otherwise modified growth promoters, biocompatibilisers, vitamins, proteins, glycoproteins, enzymes, nucleic acid, carbohydrates, minerals, nutrients, steroids, ceramics and the like and functioning matter such as spores, viruses, mammalian, plant and bacterial cells.

Claim 41 (new): Process as claimed in Claim 25 wherein polymer is selected from: polyesters including poly(lactic acid), poly(glycolic acid), copolymers of lactic and glycolic acid, copolymers of lactic and glycolic acid with poly(ethylene glycol), poly(ϵ -caprolactone), poly(3-hydroxybutyrate), poly(p-dioxanone), poly(propylene fumarate); poly (ortho esters); polyanhydrides; Poly(amino acids); polyacetals; polyketals; polyorthoesters; Polyphosphazenes; azo polymers; synthetic Non-biodegradable Polymers selected from: Vinyl polymers including polyethylene, poly(ethylene-co-vinyl acetate), polypropylene, poly(vinyl chloride), poly(vinyl acetate), poly(vinyl alcohol) and copolymers of vinyl alcohol and vinyl acetate, poly(acrylic acid) poly(methacrylic acid), polyacrylamides, polymethacrylamides, polyacrylates, Poly(ethylene glycol), Poly(dimethyl siloxane), Polyurethanes, Polycarbonates, Polystyrene and derivatives; and Natural Polymers selected from carbohydrates, polypeptides and proteins.

Claim 42 (new): A process for the preparation of a polymer composite comprising internally distributed deposition matter wherein the process comprises providing a deposit of deposition matter at the surface of a solid state polymer substrate by fluid phase deposition of discrete particles or dissolved deposition matter by immersion or spraying of solid state polymer substrate with a solution, dispersion or suspension of deposition matter, drying by freezing, evaporation, heating or blotting or by solid phase deposition by powder coating, dusting, rolling or adhering contacting the surface deposited polymer with a plasticising fluid or a mixture of plasticising fluids under plasticising conditions to plasticise and/or swell the polymer and internally distribute deposition matter, and releasing the plasticising fluid or fluids to obtain polymer composite wherein deposition matter is present, presented as concentration of deposition matter on polymer, in the

range 1×10^1 to 1×10^3 ng/mg, or of the order of picograms or nanograms per 5g polymer, or 1×10^{-12} to 1×10^{-9} wt%.

Claim 43 (new): A process as claimed in Claim 42 which comprises providing a deposit at the surface of a high surface area polymer substrate.

Claim 44 (new): Process as claimed in Claim 42 wherein the polymer substrate comprises a powder bed or a high porosity matrix.

Claim 45 (new): A process as claimed in Claim 42 wherein a deposit comprises a deposition layer of deposition matter on any internal and external exposed surfaces of the polymer substrate, including any exposed surface pores; over the entire surface area or only part or parts thereof.

Claim 46 (new): A process as claimed in Claim 42 wherein the solid state polymer substrate is obtained by contacting polymer with plasticising fluid or a mixture of plasticising fluids under plasticising conditions to plasticise the polymer, and releasing the fluid in manner to obtain a solid state substrate polymer.

Claim 47 (new): A process as claimed in Claim 42 carried out in the absence of additional solvent capable of dissolving the deposition matter.

Claim 48 (new): A process as claimed in Claim 42 wherein immersion is for a time of the order 1 second up to 48 hours.

Claim 49 (new): A process as claimed in Claim 42 wherein drying is for a time up to 48 hours.

Claim 50 (new): A process as claimed in Claim 42 wherein plasticising conditions comprise a temperature in the range -200°C to +500°C.

Claim 51 (new): A process as claimed in Claim 42 wherein plasticising conditions comprise a pressure from in excess of 1 bar to 10000 bar.

Claim 52 (new): A process as claimed in Claim 42 wherein the process is carried out for a contact time of surface deposited polymer and plasticising fluid of 1 millisecond up to 5 hours.

Claim 53 (new): A process as claimed in Claim 42 which is carried out without blending.

Claim 54 (new): A process as claimed in Claim 42 wherein plasticising fluid is selected from carbon dioxide, di-nitrogen oxide, carbon disulphide, aliphatic C₂₋₁₀ hydrocarbons such as ethane, propane, butane, pentane, hexane, ethylene, and halogenated derivatives thereof such as for example carbon tetrafluoride or chloride and carbon monochloride trifluoride, and fluoroform or chloroform, C₆₋₁₀ aromatics such as benzene, toluene and xylene, C₁₋₃ alcohols such as methanol and ethanol, sulphur halides such as sulphur hexafluoride, ammonia, xenon, krypton, and mixtures thereof.

Claim 55 (new): A process as claimed in Claim 42 wherein deposition material is selected from (pharmaceutical) drugs and veterinary products; agrochemicals as pest and plant growth control agents; human and animal health products; human and animal growth promoting, structural, or cosmetic products including products intended for growth or repair or modelling of the skeleton, organs, dental structure; absorbent biodeposition materials for poisons, toxins.

Claim 56 (new): A process as claimed in Claim 42 wherein deposition matter alternatively or additionally comprises function enhancing components, including naturally occurring or synthetic or otherwise modified growth promoters, biocompatibilisers, vitamins, proteins, glycoproteins, enzymes, nucleic acid, carbohydrates, minerals, nutrients, steroids, ceramics and the like and functioning matter such as spores, viruses, mammalian, plant and bacterial cells.

Claim 57 (new): Process as claimed in Claim 42 wherein polymer is selected from: polyesters including poly(lactic acid), poly(glycolic acid), copolymers of lactic and glycolic acid, copolymers of lactic and glycolic acid with poly(ethylene glycol), poly(e-caprolactone), poly(3-hydroxybutyrate), poly(p-dioxanone), poly(propylene fumarate); poly (ortho esters); polyanhydrides; Poly(amino acids); polyacetals; polyketals; polyorthoesters; Polyphosphazenes; azo polymers; synthetic Non-biodegradable Polymers selected from: Vinyl polymers including polyethylene, poly(ethylene-co-vinyl acetate), polypropylene, poly(vinyl chloride), poly(vinyl acetate), poly(vinyl alcohol) and copolymers of vinyl alcohol and vinyl acetate, poly(acrylic acid) poly(methacrylic acid), polyacrylamides, polymethacrylamides, polyacrylates, Poly(ethylene glycol), Poly(dimethyl siloxane), Polyurethanes, Polycarbonates, Polystyrene and derivatives; and Natural Polymers selected from carbohydrates, polypeptides and proteins.

Claim 58 (new): A polymer composite when obtained by the process of Claim 25.

Claim 59 (new): The use of a polymer composite or a scaffold thereof prepared by the process of Claim 25, for drug delivery,

in bioremediation, as a biocatalyst or biobarrier for human or animal or plant matter, as a structural component comprising the polymer and optional additional synthetic or natural metal, plastic, carbon or glass fibre mesh, scrim, rod or like reinforcing for medical or surgical insertion, for insertion as a solid monolith into bone or tissue, as fillers or cements for wet insertion into bone or teeth or as solid aggregates or monoliths for orthopaedic implants such as pins, or dental implants such as crowns.